SUPERFUND RESPONSE ACTION PRIORITY PANEL REVIEW FORM

Date Form Completed: 2/14/2013

General Site Information

Region:	Region 4	City:	Atlanta	State:	Georgia
CERCLIS EPA ID:	TND980559033		CERCLIS Site Name:	Velsicol Chemical Corp. (Hardeman County)	
NPL Status: (P/F/D)	Final (F)		Year Listed to NPL:	1983	

Brief Site Description: *(Site Type, Current and Future Land Use, General Site Contaminant and Media Info, Site Area and Location information.)*

The Velsicol Chemical Corp. Hardeman County Landfill Superfund Site (the "Site") is located in hilly, rural terrain near Toone, Tennessee. Velsicol Chemical Corp. reportedly disposed of between 130,000 and 300,000 drums of pesticide manufacturing waste in 3.3 linear miles of 10- to 15-foot-deep, unlined trenches from 1964 through 1973. The predominant VOC contaminants present in the unconfined aquifer, underlying and emanating from the Landfill Disposal Areas, are carbon tetrachloride and chloroform. Contaminated groundwater flows from the Landfill Disposal Areas toward the northeast, north, and northwest, and discharges as groundwater seeps and stream base flow into Pugh Creek to the east, unnamed streams to the north and northwest, and Clover Creek to the north. The unconfined aquifer plume for carbon tetrachloride above the MCL of 5 ug/L is approximately 1,725 acres in size. Of this, approximately 525 acres are above 5,000 ug/L, or 1,000 times the MCL. This Site constitutes one of the most, if not this country's most, contaminated carbon tetrachloride site. The Site's four primary waste disposal areas collectively encompass 24 acres, plus there is a 100-foot-long by 15-foot-wide drum disposal trench outside the originally identified disposal areas that was discovered in 2011. The Landfill Disposal Areas contain principal threat wastes such as liquids and other wastes present in any remaining intact drums, high concentrations of highly mobile carbon tetrachloride in soil and non-aqueous phase liquids (NAPL), and highly toxic pesticide waste residues within the waste zone. The estimated VOC mass for the Middle Disposal Area and North Disposal Area vadose zone is projected to be approximately 6,800,000 pounds total with approximately 2% in the Middle Disposal Area and 98% in the North Disposal Area. The Site comprises two OUs; the contaminated groundwater (OU1) and the Landfill Disposal Areas (OU2). Under the current conditions, human receptors at the Site include area residents living adjacent to the Landfill Disposal Area property and site workers. These receptors may be exposed to VOCs via the ambient air pathway. Although there are no groundwater production wells located within the impacted plume boundary of the Site, there are two residences overlying the groundwater plume with vapor intrusion issues that are addressed through operating vapor mitigation systems. Land use within the area overlying impacted groundwater consists of residential, agricultural pastures, and forested terrain. The future use of these areas is expected to be similar to current uses.

General Project Information

Type of Action:	Remedial	Site Charging SSID:	0475
Operable Unit:	0U2 (the Landfill Disposal Areas)	CERCLIS Action RAT Code:	RA

Is this the final action for the site that will result in a site construction completion?	☐ Yes	☒ No
Will implementation of this action result in the Environmental Indicator for Human Exposure being brought under control?	☐ Yes	☒ No

Response Action Summary

Describe briefly site activities conducted in the past or currently underway:

Velsicol performed initial response actions at the Site in 1979 and 1980 to address the immediate human health risk posed by the Site. The use of residential wells in the vicinity of the Landfill Disposal Areas was halted and replaced by a municipal domestic water supply in 1979. A groundwater extraction and treatment system (GETS) was constructed in 1996, became fully operational in November 1997, and was shut down in November 2003. The GETS was taken offline once it was determined that the GETS vapor-phase off-gas treatment unit required replacement and the extraction well

network's design was based on a faulty site conceptual model. In 1980, a Velsicol contractor constructed clay caps over the Landfill Disposal Areas. Subsequent to the issuance of the OU2 ROD, multi-layer geo-composite caps were constructed over the majority of the Landfill Disposal Areas in 1997. Where present, the caps have effectively eliminated the potential risk due to direct contact with the VOC and pesticide waste materials in the Landfill Disposal Areas. However, there are multiple locations along the edges of the disposal areas where it is suspected that filled drum burial trenches extend outside the limits of the caps, and the newly identified 100-foot-long by 15-foot-wide drum disposal trench is outside of the capped drum disposal areas. Furthermore, the landfill capping remedy has not served to reduce the contaminant mass present at the Site and has not served to eliminate the Landfill Disposal Areas as a potential ongoing source of groundwater and ambient air contamination. A multi-year, multi-phase SVE Pilot Test remediation study has been underway at the Site's South Disposal Areas (SDAs) since June 2009. The objectives of the SVE Pilot Test are to determine the technology's effectiveness at the Site, develop data for the future design of SVE remediation systems for the Site's other Landfill Disposal Areas, and to remediate the SDAs.

Specifically identify the discrete activities and site areas to be considered by this panel evaluation:

The implementation of the OU2 remedy was updated in the 2012 Amended ROD (AROD). The major components of the amended OU2 remedy that are being added as part of the 2012 AROD include::

- Construction of a multi-layer geo-composite cap over the newly discovered, uncapped disposal trench.
- Construction of approximately 2,100 linear feet of multi-layer geo-composite cap extensions for other portions of the Landfill Disposal Areas where drum trenches extend outside the limits of the current cap.
- Construction and operation of a SVE treatment system for the Middle Disposal Area and North Disposal Area waste zones and underlying vadose zone soils.
- Indoor and ambient air monitoring to insure residents and site workers are not exposed to unacceptable levels of site related COC's.
- Long term maintenance of the Landfill Disposal Area caps.

Briefly describe additional work remaining at the site for construction completion after completion of discrete activities being ranked:

Additional work will be required at the Site to implement the OU1 (groundwater) remedy, which has yet to be determined.

Response Action Cost

Total Cost of Proposed Response Action:

($ amount should represent total funding need for new RA funding from national allowance above and beyond those funds anticipated to be utilized through special accounts or State Superfund Contracts.)

$52,857,000 (total funding request in current dollars) = $58,657,000 (total alternative cost in current dollars from FFS) - $5,800,000 (Tennessee contribution in current dollars)

Source of Proposed Response Action Cost Amount:

(ROD, 30%, 60%, 90% RD, Contract Bid, USACE estimate, etc…)

Amended ROD

Breakout of Total Action Cost Planned Annual Need by Fiscal Year:

(If the estimated cost of the response action exceeds $10 million, please provide multiple funding scenarios for fiscal year needs; general planned annual need scenario, maximum funding scenario, and minimum funding scenario.)

Exemption 5: DP

Exemption 5: DP

Other information or assumptions associated with cost estimates?
Assumptions associated with the costs estimates include: • Construction of approximately 2,100 linear feet of multi-layer geo-composite cap extension for portions of the Landfill Disposal Areas where drum trenches extend outside the limits of the current cap. • Use of new nested SVE wells and the existing pilot test treatment equipment including its vapor phase granular activated carbon (GAC) off-gas treatment system for the Middle Disposal Area SVE treatment system; and operation for approximately 6 years. • Use of new nested SVE wells and new SVE treatment equipment including a regenerative thermal oxidizer off-gas treatment system for the North Disposal Area SVE treatment system; and operation for approximately 12 years.
Readiness Criteria
1. Date State Superfund Contract or State Cooperative Agreement will be signed (Month)?
February 2013
2. If Non-Time Critical, is State cost sharing (provide details)?
N/A
3. If Remedial Action, when will Remedial Design be 95% complete?
September 3, 2013
4. When will Region be able to obligate money to the site?
September 2013
5. Estimate when on-site construction activities will begin:
April 2014

6. Has CERCLIS been updated to consistently reflect project cost/readiness information?

Yes

Site/Project Name:	Velsicol Chemical Corp. (Hardeman County)

Criteria #1 - RISKS TO HUMAN POPULATION EXPOSED (Weight Factor = 5)

Describe the exposure scenario(s) driving the risk and remedy. Include risk and exposure information on current/future use, on-site/off-site, media, exposure route, and receptors:

For the human health risk evaluation, the primary COCs contributing to the overall carcinogenic risk drivers are carbon tetrachloride and tetrachloroethene. For non-cancer, the primary COCs are carbon tetrachloride, chloroform, heptachlor epoxide, and manganese. Potential receptors considered in the Human Health Risk Assessment were current residents, future hypothetical residents, landfill workers, adolescent recreators, and adult sportsmen. The current residential exposure scenario only considered air-related exposure routes. Direct exposure to groundwater was not considered a complete exposure pathway for current residents due to provision of a clean municipal water supply and ongoing efforts to establish protective institutional controls. Future residential exposure scenarios include groundwater exposure via ingestion, inhalation, and dermal contact as well as air-related exposure routes. The air pathway cancer risk estimates for the current resident, hypothetical future residents, and adult landfill worker are estimated to be 2.5×10^{-5}, 4.7×10^{-5}; and 1.4×10^{-6}, respectively. Although the current residential air pathway risk estimates fall within EPA's acceptable risk range (based on a 30 year arithmetic mean of over 700 air samples collected over an entire year), periodic spikes of carbon tetrachloride in the ambient air, well in excess of the 10^{-4} site screening value do occur. There is no data to suggest that these ambient values are decreasing, and may indeed increase at some point in the future. The total risk from direct exposure to groundwater, ambient air, and indoor air at this site to a hypothetical future resident is estimated to be of 6.0×10^{-2}. The primary COCs contributing to the risk level are carbon tetrachloride and tetrachloroethene in groundwater. Uncapped portions of buried drum pesticide manufacturing waste also pose an unacceptable direct contact risk under the hypothetical future residential scenario. The hazard index (HI) for the hypothetical future residents inclusive of the groundwater exposure pathway is 540. The primary COCs contributing to the HI include carbon tetrachloride, chloroform, heptachlor epoxide, and manganese in groundwater.

Estimate the number of people reasonably anticipated to be exposed in the absence of any future EPA action for each medium for the following time frames:

MEDIUM	**<2yrs**	**<10yrs**	**>10yrs**
Ambient/Indoor Air	~150 people	>150 people	>150 people
Waste Materials/Surface Soil	None	None	None
Groundwater	None	None	None

Discuss the likelihood that the above exposures will occur:

Exposure to ambient/indoor air will occur. There are currently residents living adjacent to the Landfill Disposal Area property and on the land overlying the groundwater plume. Two of the residences had indoor air concentrations that exceeded 10^{-4} risk screening levels, and mitigation systems have been installed.

It is unlikely, but possible that exposure to waste materials/surface soil will occur. The Site is fenced, and most of the Landfill Disposal Areas are capped; however, it is possible that a trespasser could be exposed to an uncapped area.

It is unlikely, but possible that exposure to groundwater will occur. An attempt has been made to establish land use restrictions on deeds prohibiting the use of groundwater for those parcels where at least a portion of the parcel is located within the Site's identified groundwater contaminant plume. To date land use deed restrictions have been recorded on 58 of the targeted 60 parcels of interest. There remain two property owners who control two parcels constituting 120 acres of land within the groundwater contaminant plume that will not allow the placement of land use deed restrictions on those parcels.

Other Risk/Exposure Information?

None.

Site/Project Name:	Velsicol Chemical Corp. (Hardeman County)

Criteria #2 – SITE/CONTAMINANT STABILITY (Weight Factor = 5)

Describe the means/likelihood that contamination could impact other areas/media given current containment:

The waste placed in the Landfill Disposal Areas included manufacturing residues of heptachlor, dieldrin, endrin, and heptachlor epoxide, which also contained VOCs. The predominant VOC contaminants present in the unconfined aquifer, underlying and emanating from the Landfill Disposal Areas, are carbon tetrachloride and chloroform. The VOC component of the waste material is highly mobile; carbon tetrachloride was detected in all media sampled at the Site. Contaminants released from compromised drums have migrated downward through the underlying sandy unsaturated (vadose zone) soils to the water table aquifer. Contaminated groundwater flows from the Landfill Disposal Areas toward the northeast, north, and northwest, and discharges as groundwater seeps and stream base flow into Pugh Creek to the east, unnamed streams to the north and northwest, and Clover Creek to the north. A comprehensive ambient air sampling program, which included the collection of over 700 samples, was performed in 2007 and 2008 to determine the air quality adjacent to residential structures, groundwater seeps, surface water, and the Landfill Disposal Areas. Concurrent with the ambient air sampling effort, indoor air samples were collected from residences situated along Old Toone Road along the axis of the groundwater contaminant plume. The air sampling data indicated that both the Landfill Disposal Areas and the impacted water from groundwater seeps and surface water bodies are sources of VOC emissions to the indoor and ambient air. Currently, there is no mechanism in place to prevent the continued migration of the VOCs from the waste materials to the ambient air, groundwater, surface water, or indoor air.

Are the contaminants contained in engineered structure(s) that currently prevents migration of contaminants? Is this structure sound and likely to maintain its integrity?

Not for the VOC component of the waste materials. The existing caps, where present, have been effective at containing the pesticide wastes disposed of at the Site.

Are the contaminants in a physical form that limits the potential to migrate from the site? Is this physical condition reversible or permanent?

Not for the VOC component of the waste materials. The pesticide and SVOC components of the waste are relatively immobile in the environment.

Are there institutional physical controls that currently prevent exposure to contamination? How reliable is it estimated to be?

Yes, the site has institutional controls. As discussed above, land use restrictions have been recorded on deeds prohibiting the use of groundwater for the majority of those parcels where at least a portion of the parcel is located within the Site's identified groundwater contaminant plume. There remain two property owners who control two parcels constituting 120 acres of land within the groundwater contaminant plume that will not allow the placement of land use deed restrictions on those parcels. In addition to the prohibition of groundwater use, the Landfill Disposal Area parcel deed restriction also prohibits any subsurface disturbance without the consent of USEPA and TDEC.

Yes, the site has physical controls. The Site is fenced, which restricts access, and most of the Landfill Disposal Areas are capped, which prevents direct contact with the waste materials in areas where the caps are present. There are also vapor intrusion mitigation systems installed in two residences located adjacent to the site.

Other information on site/contaminant stability?

None.

Site/Project Name:	Velsicol Chemical Corp. (Hardeman County)

Criteria #3 – CONTAMINANT CHARACTERISTICS (Weight Factor = 3)

(Concentration, toxicity, and volume or area contaminated above health based levels)

List Principle Contaminants (Please provide average and high concentrations.):

(Provide upper end concentration (e.g. 95% upper confidence level for the mean, as is used in a risk assessment, or maximum value [assuming it is not a true outlier], along with a measure of how values are distributed {e.g. standard deviation} or a central tendency values [e.g., average].)

Contaminant	*Media	**Concentrations
Carbon Tetrachloride	GW	40,000 (Maximum) 29,000 ug/L (Arithmetic Mean)
Carbon Tetrachloride	AR (Ambient)	327 ug/m^3 / 52 ppbv (Maximum) 22.9 ug/m^3 / 3.6 ppbv (95% UCL)
Carbon Tetrachloride	AR (Indoor)	27 ug/m^3 / 4.3 ppbv (Maximum) 5.5 ug/m^3 / 0.88 ppbv (95% UCL)
Carbon Tetrachloride	SW	400 ug/L (Maximum) 133 ug/L (95% UCL)
Carbon Tetrachloride	SL	4,700 mg/kg (Maximum) 770 mg/kg (Arithmetic Average)
Carbon Tetrachloride	Soil Gas	37,000 ppmv / 3.7% (Maximum) 9,500 ppmv / ~1% (Arithmetic Average)

*(*Media: AR – Air, SL – Soil, ST – Sediment, GW – Groundwater, SW – Surface Water)*

*(**Concentrations: Provide concentration measure used in the risk assessment and Record of Decision as the basis for the remedy.)*

Describe the characteristics of the contaminant with regards to its inherent toxicity and the significance of the concentrations and amount of the contaminant to site risk. *(Please include the clean up level of the contaminants discussed.)*

EPA has determined that carbon tetrachloride is a probable human carcinogen. In addition, carbon tetrachloride has been shown to have noncarcinogenic effects on the liver and kidney. The MCL for carbon tetrachloride is 5 ug/L, and the site-specific screening level based on a 10^{-4} cancer risk for residential indoor air is 6.5 ppbv.

Describe any additional information on contaminant concentrations which could provide a better context for the distribution, amount, and/or extent of site contamination. *(e.g. frequency of detection/outlier concentrations, exposure point concentrations, maximum or average concentration values, etc…..)*

The extent and magnitude of the ambient air impacts are characterized by carbon tetrachloride concentrations. Carbon tetrachloride was detected in 766 of 773 ambient air samples at a range of 0.23 ug/m^3 (0.037 ppbv) to 327 ug/m^3 (52 ppbv). Carbon tetrachloride was detected in ambient air as far as 12,000 feet away from the Landfill Disposal Areas.

The extent and magnitude of the site's groundwater plume is characterized by carbon tetrachloride concentrations.

Concentration Range	Plume Area
>5,000 ug/L (>1,000 x MCL)	525 acres
>500 ug/L (>100 x MCL)	1,025 acres
>50 ug/L (>10 x MCL)	1,300 acres
>5 (> MCL)	1,725 acres

Other information on contaminant characteristics?

None.

Site/Project Name:	Velsicol Chemical Corp. (Hardeman County)

Criteria #4 – THREAT TO SIGNIFICANT ENVIRONMENT (Weight Factor = 3)

(Endangered species or their critical habitats, sensitive environmental areas.)

Describe any observed or predicted adverse impacts on ecological receptors including their ecological significance, the likelihood of impacts occurring, and the estimated size of impacted area:

The 2011 Ecological Risk Assessment concluded that there are no unacceptable risks to the aquatic wildlife communities in Pugh Creek, Clover Creek, or the unnamed streams. Similarly, there are no unacceptable risks to mammal and bird populations at the Site. The available information was adequate to determine that ecological risks are negligible at the Site and that there is no need for further action on the basis of ecological risk.

Would natural recovery occur if no action was taken? ☐ Yes ☐ No
If yes, estimate how long this would take.

Not applicable.

Other information on threat to significant environment?

Not applicable.

Site/Project Name:	Velsicol Chemical Corp. (Hardeman County)

Criteria #5 – PROGRAMMATIC CONSIDERATIONS (Weight Factor = 4)

(Innovative technologies, state/community acceptance, environmental justice, redevelopment, construction completion, economic redevelopment.)

Describe the degree to which the community accepts the response action.

The USEPA presented the remedy ultimately selected in the Amended ROD to the community at a public meeting on July 31, 2012, and held a public comment period from July 13, 2012 through August 11, 2012. The USEPA mailed a fact sheet to individuals and groups on the Site mailing list and published a Public Notice for the Public Meeting in the Bolivar Bulletin Times. The USEPA received three oral comments during the public meeting. The USEPA did not receive any written comments during the public comment period. Two of the oral comments expressed support for alternative remedial actions, and one expressed concern that residents would be forced to relocate. The USEPA provided responses to these comments in the Amended ROD.

Describe the degree to which the State accepts the response action.

The Tennessee Department of Environment and Conservation (TDEC), the support agency for the state of Tennessee, has been involved in the process and supports the remedy selected in the Amended ROD.

Describe other programmatic considerations, e.g.; natural resource damage claim pending, Brownfields site, use of innovative technology, construction completion, economic redevelopment, environmental justice, etc…

Of the 233 sites that underwent five-year reviews in fiscal year 2011, this site was one of the eight sites whose protectiveness determination was "not protective."